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Tamper Proof Rain Gages

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An unbroken record of the precipitation for a given area is useful for managing forest and range lands, and necessary for hydrologic research. A great deal of time and expense is required to record such data. It is the exception rather than the rule, however, when an unbroken record is available for even one gage.

A principal cause of lost records is vandalism. Gages are upset, stolen, or used for target practice. This note describes two gages designed to prevent such vandalism.

One design consists primarily of an 8-inch-diameter steel pipe, welded shut with a plate on one end, bolted and padlocked to two steel fenceposts set in concrete (fig. 1). Once this gage is secured to its mooring it is immobile. Rubbing or scratching by livestock has no effect. Attempts by vandals to twist or bend the moorings have been unsuccessful. Freezing causes no harm, since the ice merely forces its way up inside the gage. Also, this gage will simply deflect angling shots by any type of firearm. Only straight shots by the larger magnum rifles will penetrate.

A disadvantage is that a standard 30-inch gage will weigh about 70 pounds. Thus either

a measuring stick must be used, or the gage must be unbolted and its contents poured into a graduate or other container for weighing. If snowfall is not likely to be a problem, the length and corresponding weight can be reduced considerably, depending on (1) amount of precipitation likely to be encountered, and (2) frequency with which the gages are to be emptied.

An alternative design to make weighing easier consists basically of an open standard rain gage locked inside a steel pipe or oil-well casing embedded in concrete (fig. 2). Thus the gage can be removed from its bullet-proof case and weighed, but it has two disadvantages compared to the previous design: (1) an early freeze can rupture the gage, and (2) a determined vandal could knock the bottom out of the gage or batter in the projecting collar.

Hiding or camouflaging a rain gage seems to invite trouble. A well-kept gage, painted a pleasing color, posted with a prominent sign in a conspicuous place creates the impression that it is serving a useful purpose. The gage should be painted with a good rust preventative. Red lead paint has been recommended as the best. Aluminum paint may be used, but requires more frequent maintenance.

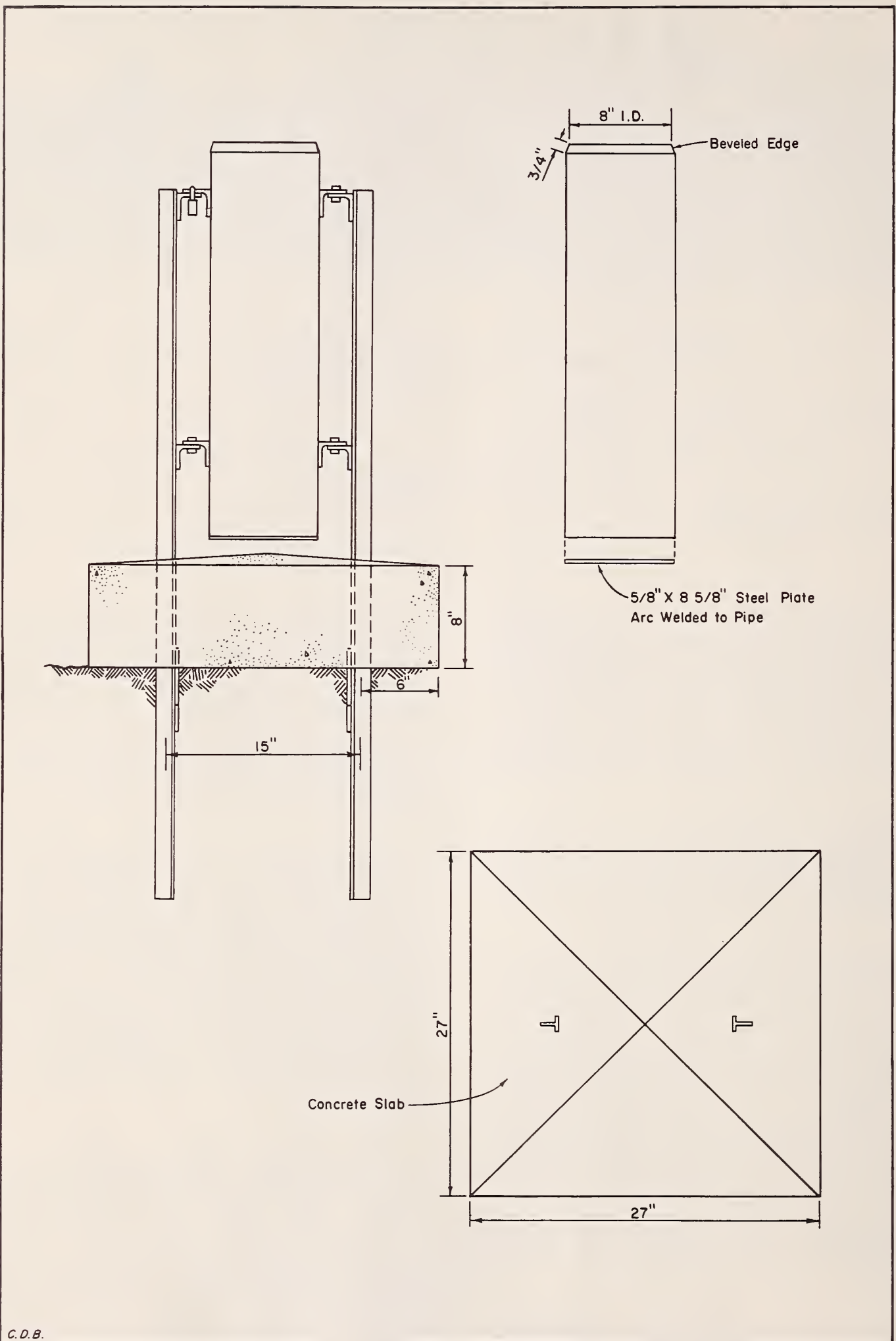
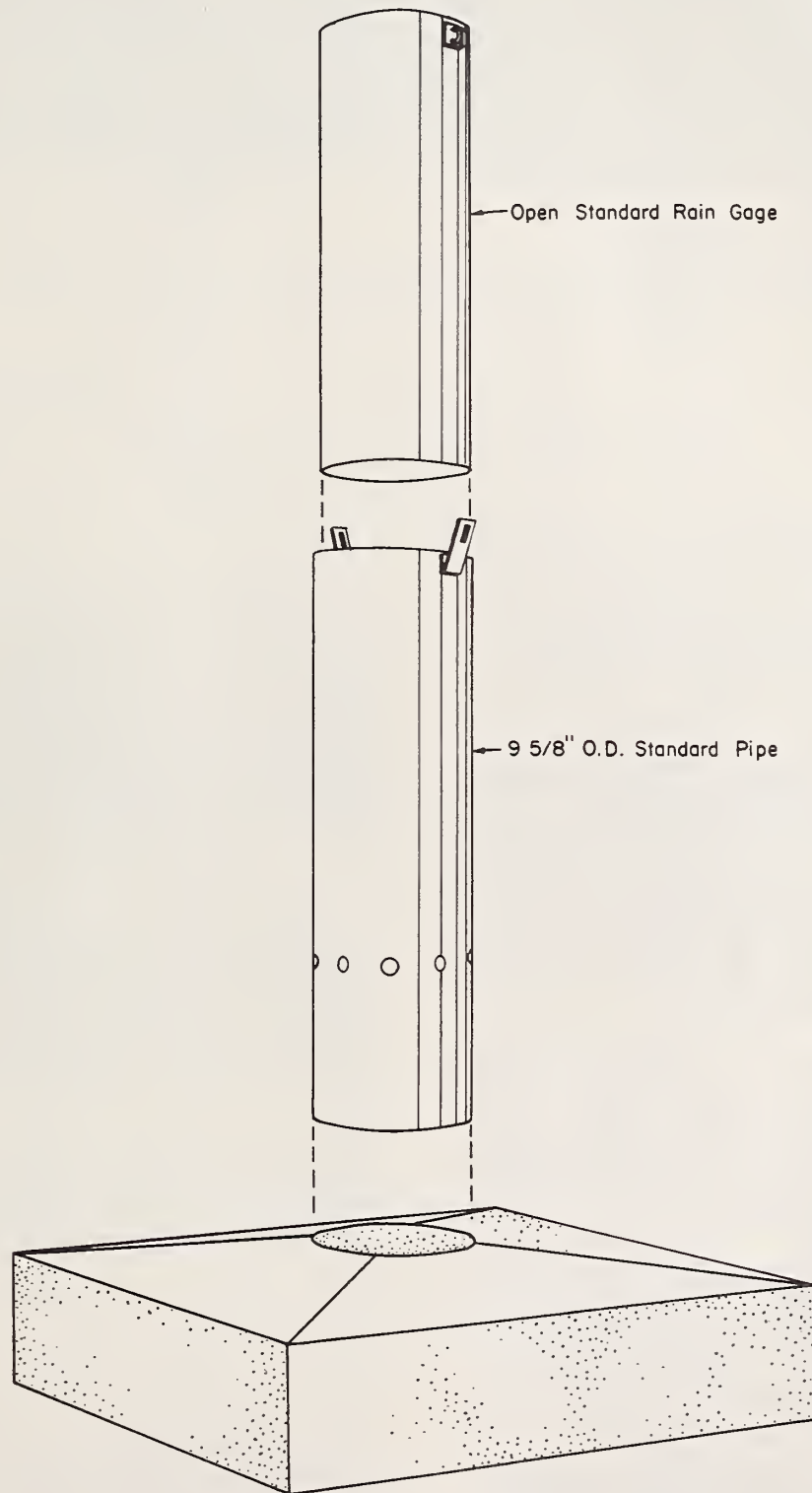


Figure 1.--Tamper-proof gage made of steel pipe.



C.D.B.

Figure 2.--Standard gage inside a steel casing.

Construction Details

The following materials are required for the steel-pipe gage described first:

Quantity	Item	Size
1	8-inch inside diameter standard steel pipe	30 inches long
1	Circular steel plate	5/8 inch thick × 7 5/8 inches in diameter
2	Steel fenceposts	5 feet long
8	"L" brackets	1/4 inch × 2 inches
3	Bolts	3/8 inch × 1 inch
1	Padlock	
1	Concrete slab	27 × 27 × 8 inches

The circular steel plate is arc welded to one end of the steel pipe. A 3/4-inch bevel is ground on the other end of the pipe. With a little care, a knife edge superior to that usually found on most commercial gages may be obtained.

Four of the "L" brackets are then welded to the steel fenceposts. One should be welded flush with the top of each post and another 20 inches below. The remaining four brackets are then welded to the rain gage on opposite sides and 20 inches apart so they will coincide with those on the fenceposts.

The two steel posts are then driven 20 inches into the ground 15 inches apart. This distance may vary slightly, since the distribution of holes in the 1/4-inch "L" brackets may vary with the manufacturer.

A 27- by 27- by 8-inch concrete slab is then poured around the steel fenceposts. The slab should be sloped four ways from the center to reduce splash and allow for runoff. This size slab is probably the minimum if only poor concrete sand is available. Extreme pressure on the steel posts causes smaller slabs to crack. The size can be reduced, however, if better quality sand and gravel are available.

The rain gage is then bolted and padlocked to the brackets on the fenceposts.

For the standard gage locked within the steel case, the following materials are required:

Quantity	Item	Size
1	Open standard rain gage	30 inches
1	Standard pipe or oil well casing (9 5/8 inches, outside diameter)	34 inches
2	Hasps (hinged straps and staples)	6 inches
1	Padlock	
1	Bolt	1/2 inch × 1 inch
1	Concrete slab	27 × 27 × 8 inches

A series of 1/2-inch holes are bored around the steel casing 9 inches above the bottom edge. The two hinged straps are then welded on opposite sides to the upper edge of the casing. The two staples are welded on opposite sides of the rain gage to the lower edge of the 4-inch collar.

The steel casing is placed on the ground at the desired location and leveled with a hand level. A 27- by 27-inch concrete slab is then poured around the casing. The concrete should be sloped four ways from the bottom edge of the holes in the casing to a height of 8 inches at the outer edges. The rain gage is placed inside the steel casing and bolted and padlocked by the two hasps, which hold the gage in a vertical position and prevent its removal.

¹ Research Foresters, located at the Station's project headquarters in Albuquerque, in cooperation with the University of New Mexico; central headquarters are maintained at Fort Collins, in cooperation with Colorado State University.